

What is claimed is:

1. A scanning optical system for emitting at least one beam scanning in a main scanning direction, comprising:  
a light source that emits the at least one beam;  
a polygonal mirror that rotates and deflects the at least one beam to scan in the main scanning direction; and  
an imaging optical system that converges the at least one beam deflected by said polygonal mirror to form at least one beam spot on a surface to be scanned, the at least one beam spot scanning in the main scanning direction on the surface to be scanned,

wherein the at least one beam incident on said polygonal mirror is inclined in an auxiliary scanning direction which is perpendicular to the main scanning direction,

wherein at least one lens surface of said imaging optical system is configured such that a beam reflected therefrom is not incident on reflective surfaces of said polygonal mirror.

2. The scanning optical system according to claim 1, wherein said imaging optical system includes a lens having said at least one lens surface, said lens being positioned such that an optical axis of said lens is perpendicular to

a rotational axis of said polygonal mirror.

3. The scanning optical system according to claim 2, wherein a position at which the at least one beam emitted by said light source impinges on said polygonal mirror substantially coincides with an intersection of said polygonal mirror and the optical axis of said lens.

4. The scanning optical system according to claim 3, wherein the intersection substantially coincides with a center position of a reflective surface of said polygonal mirror in a direction of the rotational axis of said polygonal mirror.

5. The scanning optical system according to claim 1, wherein said imaging optical system includes a lens having said at least one lens surface, said lens being made of plastic.

6. The scanning optical system according to claim 1, wherein said imaging optical system includes a lens having said at least one lens surface, said at least one lens surface being symmetrical with respect to an optical axis of said lens in the auxiliary scanning direction.

7. The scanning optical system according to claim 1,  
wherein said imaging optical system includes a lens  
having said at least one lens surface, said lens facing  
said polygonal mirror,

wherein said lens and said polygonal mirror are  
configured so as to satisfy a condition:

$$H/2 < |2\beta D(D-R_{z1})/R_{z1}| \quad \dots (1)$$

where H represents a thickness of said polygonal mirror in  
the auxiliary scanning direction,  $\beta$  represents an incident  
angle of the at least one beam with respect to a reflective  
surface of said polygonal mirror in the auxiliary scanning  
direction, D represents a distance between the reflective  
surface of said polygonal mirror and said lens, and  $R_{z1}$   
represents a radius of curvature of said at least one lens  
surface of said lens in the auxiliary scanning direction.

8. The scanning optical system according to claim 1,  
wherein said imaging optical system includes a lens  
having said at least one lens surface,

wherein an other surface of said lens is configured  
such that a beam reflected therefrom proceeds toward an  
outside region of said polygonal mirror.

9. The scanning optical system according to claim 8,  
wherein said lens faces said polygonal mirror,

wherein said lens and said polygonal mirror are configured so as to satisfy a condition:

$$H/2 < |\beta D(D-L_z)/L_z|$$

$$L_z = R_{z1}R_{z2}D / (2NR_{z1}D - 2(N-1)R_{z2}D - R_{z1}R_{z2})$$

..... (2)

where H represents a thickness of said polygonal mirror in the auxiliary scanning direction,  $\beta$  represents an incident angle of the at least one beam with respect to a reflective surface of said polygonal mirror in the auxiliary scanning direction, D represents a distance between the reflective surface of said polygonal mirror and said lens,  $R_{z1}$  represents a radius of curvature of said at least one lens surface of said lens in the auxiliary scanning direction,  $R_{z2}$  represents a radius of curvature of the other lens surface of said lens in the auxiliary scanning direction, and N represents a refractive index of said lens at a design wavelength.

10. The scanning optical system according to claim 1, wherein said beam reflected by said at least one lens surface proceeds above a top surface of said polygonal mirror.

11. The scanning optical system according to claim 1, wherein said beam reflected by said at least one lens

surface proceeds below a bottom surface of said polygonal mirror.

12. The scanning optical system according to claim 1,  
wherein said imaging optical system has:

a scanning lens; and

a compensation lens provided on the surface to be  
scanned side with respect to said scanning lens, said  
compensation lens compensating for curvature of field,

wherein said scanning lens has said at least one lens  
surface,

wherein at least one surface of said scanning lens is  
formed to be an anamorphic aspherical surface,

wherein at least one surface of said compensation lens  
is formed to be an aspherical surface defined by a two-  
dimensional polynomial expression.

13. The scanning optical system according to claim 12,  
wherein said at least one lens surface of said scanning  
lens is symmetrical with respect to an optical axis of said  
scanning lens in the auxiliary scanning direction.

14. The scanning optical system according to claim 12,  
wherein one surface of said scanning lens is formed to  
be an anamorphic aspherical surface, and an other surface

of said scanning lens is formed to be a toric surface.

15. The scanning optical system according to claim 1,  
wherein said at least one beam includes a plurality of  
beams,

wherein said polygonal mirror deflects the plurality  
of beams to scan in the main scanning direction,

wherein said imaging optical system converges the  
plurality of beams deflected by said polygonal mirror to  
form a plurality of beam spots on respective surfaces to be  
scanned, the plurality of beam spots scanning in the main  
scanning direction on the respective surfaces to be scanned,

wherein the plurality of beams incident on said  
polygonal mirror are inclined in the auxiliary scanning  
direction.

16. The scanning optical system according to claim 15,

wherein said imaging optical system has:

a scanning lens; and

a plurality of compensation lenses provided on the  
surfaces to be scanned side with respect to said scanning  
lens, each of said compensation lenses compensating for  
curvature of field,

wherein the plurality of beams deflected by said  
polygonal mirror pass through said scanning lens,

wherein the plurality of beams emerged from said scanning lens pass through the plurality of said compensation lenses, respectively.

17. The scanning optical system according to claim 16, wherein optical paths of the plurality of beams between said polygonal mirror and said scanning lens are symmetrical with respect to an optical axis of said scanning lens.